

# Gene Section

## Mini Review

### NUT (nuclear protein in testis)

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#### Identity

**Hugo:** NUT

**Other names:** DKFZp434O192; MGC138683

**Location:** 15q14 (position 32425358-32437221 on the chromosome 15 genomic sequence).

**Note:** the gene name NUT has not been approved by the HUGO Gene Nomenclature Committee.

#### DNA/RNA

##### Description

The gene consists of 7 exons that span approximately 12 kb of genomic DNA in the centromere-to-telomere orientation. The translation initiation codon and the stop codon are predicted to exon 1 and exon 7, respectively.

##### Transcription

The corresponding 'wildtype' mRNA transcript is 3.6 kb.

#### Protein

##### Description

The open reading frame is predicted to encode an 1127 amino acid protein with an estimated molecular weight of 120 kDa.

##### Expression

Northern blot analysis has indicated that the normal expression of the NUT gene is highly restricted to the testis. No investigations have yet been made at the protein level.

##### Localisation

Nuclear.

##### Function

Unknown.

#### Implicated in

##### ***Carcinoma with t(15;19)(q14;p13) translocation***

##### Prognosis

Carcinoma with t(15;19) translocation is invariably fatal with a rapid clinical course when located to the midline thoracic, head and neck structures. One tumor, displaying the cytogenetic and molecular cytogenetic features of carcinoma with t(15;19) translocation, but located to the iliac bone has been reported successfully cured.

It has been suggested that a critical prognostic difference exists between BRD4-NUT/t(15;19) positive tumors and tumors where NUT is rearranged but fused to an as yet unknown partner.

##### Cytogenetics

t(15;19)(q14;p13) [reported breakpoints: t(15;19)(q11-15;p13)].

##### Hybrid/Mutated Gene

The t(15;19)(q14;p13) results in an BRD4-NUT chimeric gene where exon 10 of BRD4 is fused to exon 2 of NUT.

##### Abnormal Protein

The BRD4-NUT fusion is composed of the N-terminal of BRD4 (amino acids 1-720 out of 1372) and almost the entire protein sequence of NUT (amino acids 6-1127). The N-terminal of BRD4 includes bromodomains 1 and 2 and other, less well characterized functional domains.

##### Oncogenesis

It has been suggested that the oncogenic effect of the NUT-BRD4 fusion is caused not only by the abnormal regulation of NUT by BRD4 promoter elements but also by the consequent ectopic expression of NUT in non-germinal tissues.

## Breakpoints

**Note:** The vast majority of reported breakpoints in carcinoma with t(15;19) translocation were assigned to band 19p13, the exception being the cytogenetic interpretation of a 19q13 breakpoint reported once. The reported breakpoints on chromosome 15 have varied (15q11-q15).

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